AUTOMATIC CLOTH RETRIEVER SYSTEM

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"I hereby acknowledge that the scope and quality of this thesis is qualified for the award of the Bachelor Degree of Electrical Engineering (Electronics)"

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MY DECLARATION

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ABSTRACT

For a working couple, it is hard to find time to have laundry day where the cloth is dried through the whole day because the weather can change from sunny to rainy days. This projects use Microcontroller PIC 16F877 to install all program that will give instructions to conduct this system properly. This project will automatically retrieve-out the clothes when it is the sunny day and oppositely retrieve-in the clothes when it is a rainy day. This part needs DC motor to convert electrical power into mechanical power for retrieve-out and retrieve-in all the clothes. Temperature sensors that will be use in this project can measure temperature and day condition whether it is sunny or rainy day more accurately. LDR (Light Dependent Resistor) sensors will be use to detect light. Rain detector also will be use to sense when it begins to rain outside by detecting rain water from moisture impedance sensor locate at the rod. The dry-time of the clothes will be setup using rotary knob switch and it will automatically retrieve-in the clothes using DC motor when the dried-time is finished. This project will be display the day condition, temperature and dry-timer using LCD (Liquid Crystal Display) or indicator light such as LED (Light Emitting Diode).

ABSTRAK

Bagi setiap pasangan yang bekerja, adalah sukar untuk mencari masa yang sesuai untuk menentukan pakaian yang telah dibersihkan kering di sepanjang hari kerana dengan keadaan cuaca yang tidak menentu. Kadang-kadang panas dan adakalanya hujan secara tiba-tiba. Projek ini menggunakan Microcontroller PIC 16F877 untuk memasukkan semua program yang akan memberi arahan-arahan menjalankan sistem yang dihasilkan ini supaya dapat berfungsi dengan sebaiknya. Projek ini akan mengeluarkan ampaian baju secara automatik apabila hari cerah dan akan menarik semula ampaian baju tersebut sekiranya hari hujan. Bahagian ini memerlukan "*DC motor*" untuk menukarkan tenaga elektrik kepada tenaga mekanik supaya dapat menarik masuk dan keluar kesemua ampaian baju ini. Alat pengesan suhu yang digunakan untuk projek ini berkeupayaan untuk mengukur keadaan suhu dan hari samada hari tersebut cerah atau hari hujan dengan lebih tepat. "*LDR (Light Dependent Resistor)"* digunakan untuk mengesan cahaya sekiranya hari cerah. Pengesan air hujan juga akan digunakan untuk mengesan bila berlakunya hujan dengan mengesan air hujan yang terkena pada penderia impedans lembapan hujan yang telah diletakkan pada hujung ampaian tersebut. Masa untuk mengeringkan baju-baju yang dijemur akan di tetapkan oleh pengguna dengan menggunakan "*rotary knob switch"* dan setelah masa pengeringan yang ditetapkan tamat, secara automatik "*DC motor"* akan menarik ampaian baju ke bahagian dalam. Projek ini akan memaparkan keadaan hari, suhu, dan masa pengeringan dengan menggunakan "*LCD (Liquid Crystal Display)"* atau penunjuk cahaya seperti "*LED (Light Emitting Diode)"*.

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LIST OF SYMBOLS

C	Celcius
K	Kilo
≈	Equal to
Ω	Ohm
Hz	Hertz
M	Mega
V	Volts
LED	Light Emitter Diode
°	Degree
V	Volt
mA	Mili ampere
LDR	Light Dependant Resistor
LCD	Liquid Crystal Display
ADC	Analog Digital Converter

CHAPTER 1

INTRODUCTION

1.1 Background

People often forget to lift the suspension of clothing during the day rain. For people who working, they don't have to worry about their clothes that have been dried outside. People often don't have time to manage their routine. This project develop for working couple, it is hard to find time to have laundry day where the cloth is dried through the whole day because the weather can change from sunny to rainy days. This projects use Microcontroller PIC 16F877 to install all program that will give instructions to conduct this system properly and will automatically retrieve-out the clothes when it is the sunny day and oppositely retrieve-in the clothes when it is a rainy day. This part needs DC motor to convert electrical power into mechanical power for retrieve-out and retrieve-in all the clothes.

Temperature sensors that use in this project can measure temperature and day condition whether it is sunny or rainy day more accurately. LDR (Light Dependent Resistor) sensors use to detect light. Rain detector use to sense whether it rain or not at outside by detecting rain water from impedance sensor locate at the rod. The dry-time of the clothes will be setup using push button and it will automatically retrieve-in the clothes using DC motor when the dried-time is finished. For status display, this project will be display the day condition, temperature and dry-timer using LCD (Liquid Crystal Display) or indicator lights such as LED (Light Emitting Diode).

1.2 Project Objective

The project objective consists of the benefits that can expects to achieved as a result of spending time and exerting effort to complete a project. The main objective of done this project is to develop an automatic system for cloth retriever within required range and specific objectives of this project are listed as followed:

i. Will automatically retrieve-out the clothes when it is the sunny day and oppositely retrieve-in the clothes when it is a rainy day. This project is done by developing the circuit of Light Dependent Resistor which is could detect the sunny day and rain detector circuit to detect whether it is rainy day and programming the controller to control the motor to retrieve-out the clothes when it is sunny day and retrieve-in the cloth when it is rainy day.

ii. The dry-time of the clothes will be counted and it will automatically retrieve-in the clothes when the dried-time is finished. The dry-timer was set by user whether 3 hours, 4 hours or 5 hours.

iii. This project will be display the day condition, temperature and dry-timer. Day conditions will display sunny, cloud or rainy. It is depend on the current temperature range that has been set by programming. Also could display dry timer that has been set by user.

1.3 Project Scopes

This project concentrates on controlling the automatic cloth retriever system based on current temperature range, day condition, rainy day or sunny day. To achieve all the objectives, the developer needs to have knowledge on the following elements. Several scopes that need to be proposed for the project:

i. Use hardware and software tools to identify and control the cloth retriever system.

ii. Retrieve-in when dried-time is finished, rainy day, no sunny day and temperature below than 25˚C.

iii. Display temperature, day condition and dry-time counted.

iv. Maximum clothes weight is 5 kg.

v. Rotate 90 degree for retrieve-in and retrieve-out.

1.4 Thesis Outline

This Automatic Cloth Retriever System final thesis contains of 7 chapters and they are outlined as below:

Chapter 1 explains the introduction that includes concept of automatic cloth retriever system. It also outlines objective and scope of this system.

Chapter 2 describes the architecture used and gives a brief the literature review of system board architecture, sensor module, display module, driver circuit module and output module.

Chapter 3 discuss on the full methodology of this project. Provides description and discussion on how the design of the hardware of each module in the systems. The module consists of microcontroller board, rain sensor, LDR sensor, temperature sensor LM35DZ, LCD display, DC motor, driver circuit and output devices.

Chapter 4 discuss about the hardware development.

Chapter 5 explains the architecture of the project that consist the software implementation.

Chapter 6 discuss about all the results obtained and the limitation of the project. All discussions are concentrating on the result to each module and performance of the Automatic Cloth Retriever System. This chapter includes the integrated system testing which all the modules are combined.

Chapter 7 discuss about the conclusion and recommendation further development of the project.

CHAPTER 2

LITERATURE REVIEW

This literature review explains about relevant past research and project development which is used the almost similar system for this project.

2.1 Rain Tracker Rain Gage - Model RG-10

The Rain Gage RG-10 senses using beams infrared light. The RG-10 uses the same underlying principle used in millions of automotive rain sensing windshield wiper controls, most of which employ technology originally developed in our labs. The technology that was designed to sense tiny amounts of water in the harsh automotive environment, made it a bit more rugged yet, and applied it to the RG-10. The result is a general purpose rain sensor that may be configured for many applications. Include with a DIP switch that allows it to be set up for the mode of operation that best matches the application. The DIP switch sets the mode, the nature of the output, and the function of the auxiliary output. The RG-10 is suitable for almost any application that requires reliable and sensitive rain sensing, including automatic retraction of awnings, boat and ship window wiper control, and wiper control for specialized vehicles and equipment.

The RG-10 overcomes many of the shortcomings of conventional tipping bucket rain gauges. Tipping buckets remain the standard for accuracy and simplicity; indeed, we used such a rain gauge to calibrate the RG-10. But, a lot of water collects on a rain gauge collecting funnel before the first drop ever reaches the tipping bucket. The RG-10 senses the drops directly, and is thus able to detect a much smaller amount of water. It has a clear compound lens that makes up the sensing surface [1]. Beams of invisible, infrared light bounce around inside the lens and off the outside surface. Electronic circuits pulse infrared emitters to generate the beams, and amplify the received beams. Digital Signal Processing techniques extract small signals and help get rid of the effects of ambient light disturbances. The RG-10 was developed over many years for automotive rain sensing windshield wiper controls. The RG-10 also provided drop detection. Use this mode if want to do own external data interpretation. The output will pulse once with each detected drop.

2.2 Outdoor Retractable Laundry Hanger

This system in figure 2.1 below could work perfectly solved problem drying our laundry and make the clothes dry under the sun or indoor when it rains. We no longer need to carry heavy bamboo poles out of our windows again. Outdoor laundry system [2] equipped with German technology and parts are simple to use by our own or family members. This system is highly suitable for residents staying in high rise flats and apartments due to limited space constraints. This system work simply on a German gas spring and roller bearing from Japan, this system sit flat to the ceiling when not in use, and it makes maximum use of the air space in our home, kitchen or in your utility yards. It makes your home look neater thus giving you more space to move around.

The gas spring act to let the system move up and down using a pull and push stainless steel rod handle and it will lock at upward and downward position. The laundry hanger sit on the roller bearing on the bottom part of the system, and it allows the laundry system to move in and out of the window for the sun and wind to dry your ready washed clothes. This system features was suitable for bed sheet and blanket drying and for heavy weight load up to 25kg.

Figure 2.1: Outdoor retractable hanger operation

2.3 Temperature Control System

This project about temperature control system which is a particular system for server room. This system consists of temperature sensor, PIC, LCD (Liquid Crystal Display), driver circuits, AC air heater and AC motor. To switch on the AC heater three drivers are used for triggered process and another two used for triggered levels of the motor. This motor operated based on two levels of speed and functioning for controlling the temperature value inside of a regular room automatically. This system would operate based on values or ranges of the temperature inside the room that would be detected by using the temperature sensor. If the temperature in the first ranges (0˚C to 15˚C) the air heather will be operated to heat the very cold server room. Second range between (16˚C to 25˚C) made this system not be enabled because it is achieving normal range of temperature [3].

Motor will be triggered for level 1 when temperature ranges between 26˚C to 40˚C to decrease the temperature value. If the temperature become more than 40˚C, the motor will triggered for level 2 and become faster for this level. Both output devices are important to maintain the temperature value in the room. This system can solve be categorized into automatic system class. Problem always happened if air-conditioner broke down and made room becomes hotter or high temperature. Temperature become too cold and influenced by weather from outside of the server room. To keep maintaining the server room in suitable temperature range the motor and air heater are most important. The surrounding temperature and the outputs are operated based on the temperature ranges that may detected by temperature sensor. Programming for PIC is very important to read data and accept the signal from the sensor. At the same time, it will be maintains the temperature inside of the room and make it suitable for user.

2.4 Rollout Awnings

Rollout awning is made up of all heavy American made stock components, thick, white epoxy/PVC coated/full bath dipped over heavy aluminum alloy frames. Alloy is stronger than plain aluminum and has an elastic quality under stress to return to shape. Other companies may import German, Italian, French, or Chinese awnings & components that are lightweight, thin models for light wind and no rain only but this rollout awning will never use these inferior systems.

The steel tubes can corrode due to the galvanic Electrical Charge that never shuts off, once place outside on a wall in High Humidity and windy areas. All of the steel main frame and its components attached to it, such as the arms, shoulders, elbows and wrist connection points, stay charged up and sizzling, and can freeze up, require constant lubricant, or will just become weakened and corroded over a few years. This awning arms have Triple-Angled- Elbows with Triple-Springs sealed inside for water tightness providing Triple Strength and added stiffness for maximum use on windy beach fronts [4]. These brackets are heavy, thick aluminum alloy with thick epoxy / PVC coating to ensure complete protection from the elements.

They can be rolled up even when wet without forming mildew and provide the highest longevity for awning material used in roll out awnings. Electric motors are completely sealed and then inserted inside the fabric roller tube of the awning, never being exposed to the elements. For motor, the torque required to roll the awning in and out is always constant, allowing the motor to run almost indefinitely without breaking down.

Figure 2.2(a): Roll the awning in

Figure 2.2(b): Roll the awning out